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Initial Operation of UTST High-Beta Spherical Tokamak Merging Device Y. ONO, R. IMAZAWA, E. KAWAMORI, S. AKANUMA, R. MORII, M. ONODA, F. SUZUKI, Y. TAKASE, A. EJIRI, Y. TORII, Univ. Tokyo, T. ASAI, Nihon Univ. — The spherical tokamak (ST) merging has been studied for high-power reconnection heating/ startup without central-solenoid (CS) coil. In TS-3 merging device, two STs with major radius$\sim$0.2m were merged together in the axial direction using magnetic compression by two acceleration coils. The magnetic reconnection transformed the magnetic energy of reconnecting magnetic field through the outflow energy finally to the ion thermal energy, increasing the plasma beta of ST up to 50%. We up-scaled this merging/ reconnection heating experiments: TS-3 and 4 and also the RF heating/ current drive experiment: TST-2 to a new joint ultra-high-beta ST experiment, UTST (R$\sim$0.4m). In this device, all PF coils are located outside of the vacuum vessel, unlike the TS-3 and 4 devices to demonstrate the reactor-relevant merging startup. Its main research subjects are (1) double-null startup of STs without CS coil, (2) their reactor-relevant reconnection heating for high-beta ST formation and (3) their sustainment by advanced RF and NBI techniques. We completed the UTST device and started its initial test for the double-null startup and merging. The mega-watt heating power of reconnection is expected to transform the initial low-beta merging STs ($\sim$5%) to the high-beta ST ($\sim$30-50%) within short reconnection time.

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